

Summary of Degree Requirements for Students Entering in Catalog Year Fall 2015 or earlier: [Department of Physics & Astronomy](#)

Sanjay Khare, Chair

Rupali Chandar, Associate Chair and advisor for B.A. in astrophysics

Michael Cushing, advisor for B.S. in astrophysics

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Aniruddha Ray, advisor for B.S. in biomedical physics

Song Cheng, graduate program Director

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Degrees Offered

The department of Physics and Astronomy offers courses of study leading to (1) a Bachelor of Arts degree in Astronomy, (2) a Bachelor of Arts degree in Physics and (3) a Bachelor of Science degree in Physics. There is also an Astrophysics concentration for the Bachelor of Science in Physics.

Advanced Placement

Students with a score of 3, 4 or 5 on the Physics B test will receive credit for PHYS 2070 and 2080. Students with a score of 3, 4 or 5 on the Physics C Mechanics test will receive credit for PHYS 2130; students with a score of 3, 4 or 5 on the Physics C Electricity and Magnetism test will receive credit for PHYS 2140.

(1) Requirements for the Bachelor of Arts in Astronomy

The B.A. in astronomy requires 124 credit hours. This includes 37 hours of required astronomy and physics courses in the Department of Physics and Astronomy, eight hours of calculus, and at least 10 additional hours in the natural sciences and mathematics, chosen with the Advisor's approval. This program is intended to provide the combination of fundamental physics, together with general and advanced astronomy, required for a career in astronomy or a related area. It also has the flexibility required by students who wish to pursue interdisciplinary studies or prepare for careers in teaching or other professions requiring a fundamental understanding of the physical sciences.

Basic astronomy sequence: The sequence ASTR 2010, 2020 (6 hours) is required.

Advanced astronomy courses: The advanced courses ASTR 4810, 4820 and 4880 (9 hours) are required. PHYS 1910 is strongly recommended.

Physics courses: Either the sequence PHYS 2130 to 2140 (10 hours), or the sequence PHYS 2070 and 2080 to 2100 (12 hours) is required. In addition, PHYS 3180, 3310, 3320 and 3610 (12 hours) are required.

Required mathematics courses: One of MATH 1830, 1850 or 1920, one of MATH 1840, 1860 or 1930, and one of MATH 2850, 2880 or 2950 (12 hours) are required.

Other courses in related areas: At least 12 additional hours in natural sciences and mathematics, chosen with Advisor's approval. Possibilities include BIOL 2150, 2160, 2170 and 2180; CHEM 1230, 1240, 1280 and 1290; EEES 2210 and 2220; one of MATH 1890 or 2890; one of MATH 2850, 2880 or 2950; and one of MATH 3820, 3860 or 3880.

Free electives: Elective hours total 29 to 43 and may include, for example, ASTR 4800 and ASTR 2310, 2320, 2330 and 2340.

(2) Requirements for the Bachelor of Arts in Physics

The B.A. in physics requires 124 credit hours. This includes 34 hours in the Department of Physics and Astronomy, eight hours of calculus, and at least 10 additional hours in the natural sciences and mathematics, chosen with the Advisor's approval. This program is intended to provide the flexibility required by students who wish to pursue interdisciplinary studies, or prepare for careers in teaching or other professions requiring a fundamental understanding of the physical sciences.

Recommended introductory course: PHYS 1910 is strongly recommended.

Fundamental physics sequence: Either the sequence PHYS 2130-2140 (10 hours) or the sequence PHYS 2070-2080-2100 (12 hours) is required.

Other required physics courses: The intermediate level courses PHYS 3180, 3310, 3320, 3410 and either 3610 or 4620.

Elective courses in the major: At least nine hours of additional physics or astronomy courses numbered above 4000 are also required.

Required mathematics courses: One of MATH 1830, 1850 or 1920, and one of MATH 1840, 1860 or 1930 are required.

Other courses in related areas: At least 10 hours of other courses must be taken in natural sciences and mathematics, with the selection approved by the student's Advisor. Examples of appropriate choices include the sequences BIOL 2150, 2160, 2170 and 2180; CHEM 1230, 1240, 1280 and 1290; EEES 1010, 2210 and 2220; MATH 1890 or 2890; one of MATH 2850, 2880 or 2950; and one of MATH 3820, 3860 or 3880.

(3) Requirements for the Bachelor of Science in Physics

The B.S. in Physics consists of a core program that all students must complete and a choice of one concentration with additional requirements as listed below. The core program contains 22 hours of physics courses and 23 hours of related-area courses; the concentration must contain an additional 21 hours of physics and related courses. Another nine hours of courses from natural sciences, mathematics, or engineering are recommended.

Physics core courses: PHYS 2130, 2140, 3150, 3310, 3320 and 3410 are required. With department approval, a student may substitute PHYS 2070, 2080 and 2100 for PHYS 2130 and 2140. The introductory course PHYS 1910 is also strongly recommended for all physics majors.

Related courses: CHEM 1230 and 1280, one of MATH 1830, 1850 or 1920, one of MATH 1840, 1860, or 1930, one of MATH 1890 or 2890, one of MATH 2850, 2880, or 2950, and one of MATH 3820, 3860 or 3880 are required.

Concentrations

The student may choose one of the following concentrations:

Physics: PHYS 3180, 3610, 4210, 4230, 4240, 4310, and either 4580 or 4780.

Astrophysics: PHYS 3610, 4210, 4230 and 4240, and ASTR 4810, 4820 and 4880.

Applied Physics: PHYS 3610, 4210, 4230, 4240, 4510, and either 4580 or 4780, plus three hours of appropriate courses from physics or engineering, chosen with the Advisor's approval.

Biomedical Physics: PHYS 3180, 3610, 4130, 4230, 4240, 4430, 4440, and 4780; and related courses BIOL 2150 and 2160, plus KINE 2510, 2520, 2530 and 2540 (or alternate sequence KINE 2460, 2470, 2560, and 2570). For all courses in the department, a grade of C or better is required in order to count for the B.S. degree. In addition to the above requirements, students should consider at least three of the following optional courses: ASTR 4810, 4820 and 4880; PHYS 4130, 4510 and 4620; MATH 3190, 4300, 4740 and 4750.

Interdepartmental Major

While any course that fulfills the requirements of a physics concentration may be used in fulfilling the requirements for the interdepartmental major, the department recommends that interested students choose the 19 hours in the physics core. Interested students should meet with a departmental Advisor to discuss which courses would be most appropriate.

Minor in Physics or Astrophysics

Students seeking a minor in physics (astrophysics) must complete at least 22 (23) hours of course work as follows:

Required for both minors:

Either PHYS 2130, 2140 sequence OR 2070, 2080 and 2100 sequence; Also PHYS 3310.

Required for the physics minor:

PHYS 3180 and two physics courses numbered above 3400.

Required for the astrophysics minor: ASTR 2010, ASTR 2020, and ASTR 3880.

Students must maintain a minimum GPA of 2.0 for all course work in the minor.

Candidates for the minor must have their course work verified and approved by a departmental Advisor or Chair prior to making formal application for graduation. **Minor in Renewable Energy** (This is an interdisciplinary minor)

The Minor in Renewable Energy (MRE) has been established as an interdisciplinary minor program. It is designed for students in the STEM areas majoring in the following departments: Physics and Astronomy, Chemistry, Environmental Sciences, Biology, Mathematics, MIME, Chemical and Environmental Engineering, Electrical Engineering and Computer Science, Civil Engineering and Bioengineering. Students with other majors can enroll in the MRE provided they complete the prerequisite courses. The goal of the minor is to expose students to quantitative analyses of the use of energy in human societies, its consequences and environmental impacts. A primary focus will be on the advantages and complexities of introducing renewable energy resources. Students will be required to take at least one course in the social, political, and economic ramifications of the use of energy in general and renewable energy in particular. An internship is required to enhance the practical training of students.